

NASA TECH BRIEF

Langley Research Center



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Noise Suppressor

A noise suppressor developed at Langley Research Center is a device which reduces noise propagated through ducts. It provides high attenuation in a given duct length, significantly higher than do prior devices, and also possesses broadband noise suppression ability. This device could be used for the suppression of noise from modern turbofan aircraft engines, in noise attenuation in airflow ducts, and in mufflers for internal combustion engines.

The noise suppressor consists of multiple bands of acoustically absorbent liners on the inside wall of the duct. These bands are placed in adjacent positions along the duct axis and are made from single or multiple layers of porous sheet material separated by a spacing medium such as honeycomb. The first band is a sound-reflecting element which reflects sound back toward the source and also reflects sound which is directed toward the source from another point in the duct. The second element is a band which dissipates sound energy. The physical properties of the second band are adjusted to minimize the transmission of sound from the first and third element bands. The third element is a band where sound which has passed through the first two bands is reflected back to the second band to be dissipated.

The entire device forms an acoustic trap which utilizes the reflective elements on the ends to direct the sound energy into the sound-dissipating element in the center. The noise suppressor may also be made of groups of reflective and dissipative elements placed in the duct as splitters, rather than as bands around the duct perimeter, to provide sound suppression. The device achieves large suppression by utilizing the interactive effects of these different suppression devices.

Notes:

1. A set of acoustic equations in matrix form has been derived for the sound field in and radiated from multisection ducts and may be obtained from:

National Technical Information Service
Springfield, Virginia 22151
Single document price \$3.75
(or microfiche \$2.25)

Reference: NASA TR R-419 (N74-23274),
Acoustic Theory of Axisymmetric Multi-
sectioned Ducts

2. Technical questions may be directed to:

Technology Utilization Officer
Langley Research Center
Mail Stop 139-A
Hampton, Virginia 23665
Reference: B74-10261

Patent status:

This invention has been patented by NASA (U.S. Patent No. 3,830,335). Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to:

Patent Counsel
Langley Research Center
Mail Stop 313
Hampton, Virginia 23665

Source: William E. Zorumski
Langley Research Center
(LAR-11141)

Category: 03 (Physical Sciences)

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1. The purpose of this report is to provide a summary of the results of the investigation of the problem of the stability of the motion of a rigid body in a fluid medium.

2. The results of the investigation are presented in the following sections:

3. The first section is devoted to a review of the literature on the subject.

4. The second section is devoted to a description of the experimental apparatus.

5. The third section is devoted to a description of the experimental results.

6. The fourth section is devoted to a discussion of the results.

7. The fifth section is devoted to a summary of the results.

8. The sixth section is devoted to a list of references.

9. The seventh section is devoted to a list of symbols.

10. The eighth section is devoted to a list of abbreviations.

11. The ninth section is devoted to a list of figures.

12. The tenth section is devoted to a list of tables.

13. The eleventh section is devoted to a list of appendices.

14. The twelfth section is devoted to a list of footnotes.

15. The thirteenth section is devoted to a list of references.

16. The fourteenth section is devoted to a list of symbols.

17. The fifteenth section is devoted to a list of abbreviations.

18. The sixteenth section is devoted to a list of figures.

19. The seventeenth section is devoted to a list of tables.

20. The eighteenth section is devoted to a list of appendices.

21. The nineteenth section is devoted to a list of footnotes.

22. The twentieth section is devoted to a list of references.

23. The twenty-first section is devoted to a list of symbols.

24. The twenty-second section is devoted to a list of abbreviations.

25. The twenty-third section is devoted to a list of figures.

26. The twenty-fourth section is devoted to a list of tables.

27. The twenty-fifth section is devoted to a list of appendices.

28. The twenty-sixth section is devoted to a list of footnotes.